

US EPA ARCHIVE DOCUMENT

ASSESSING THE QUALITY AND QUANTITY OF DEPRESSIONAL WETLANDS IN THE REDWOOD RIVER WATERSHED UTILIZING A PROBABILISTIC SURVEY DESIGN

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EMAP 2007 Symposium

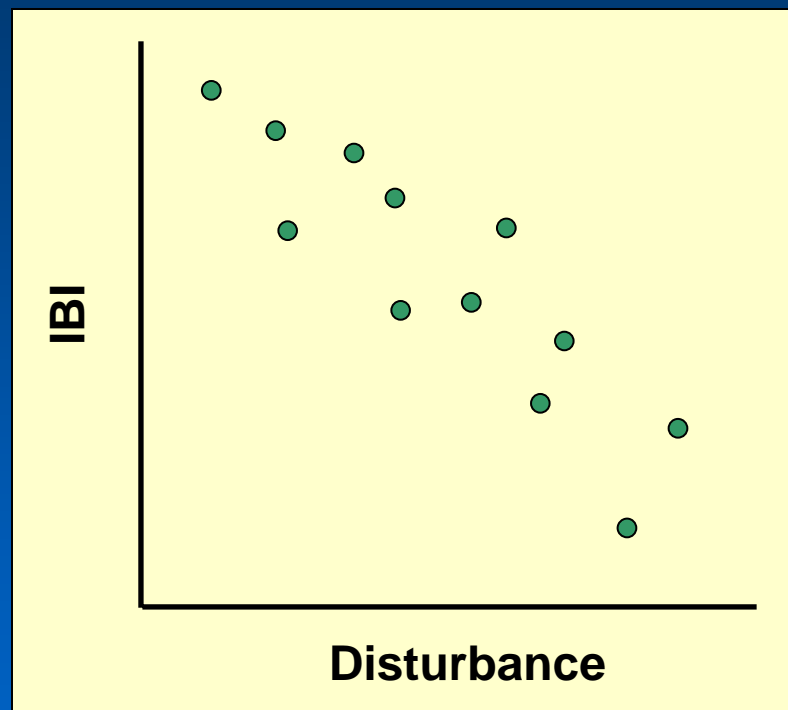
April 10-11th 2007

Washington, DC

Introduction

Index of Biological Integrity (IBI)

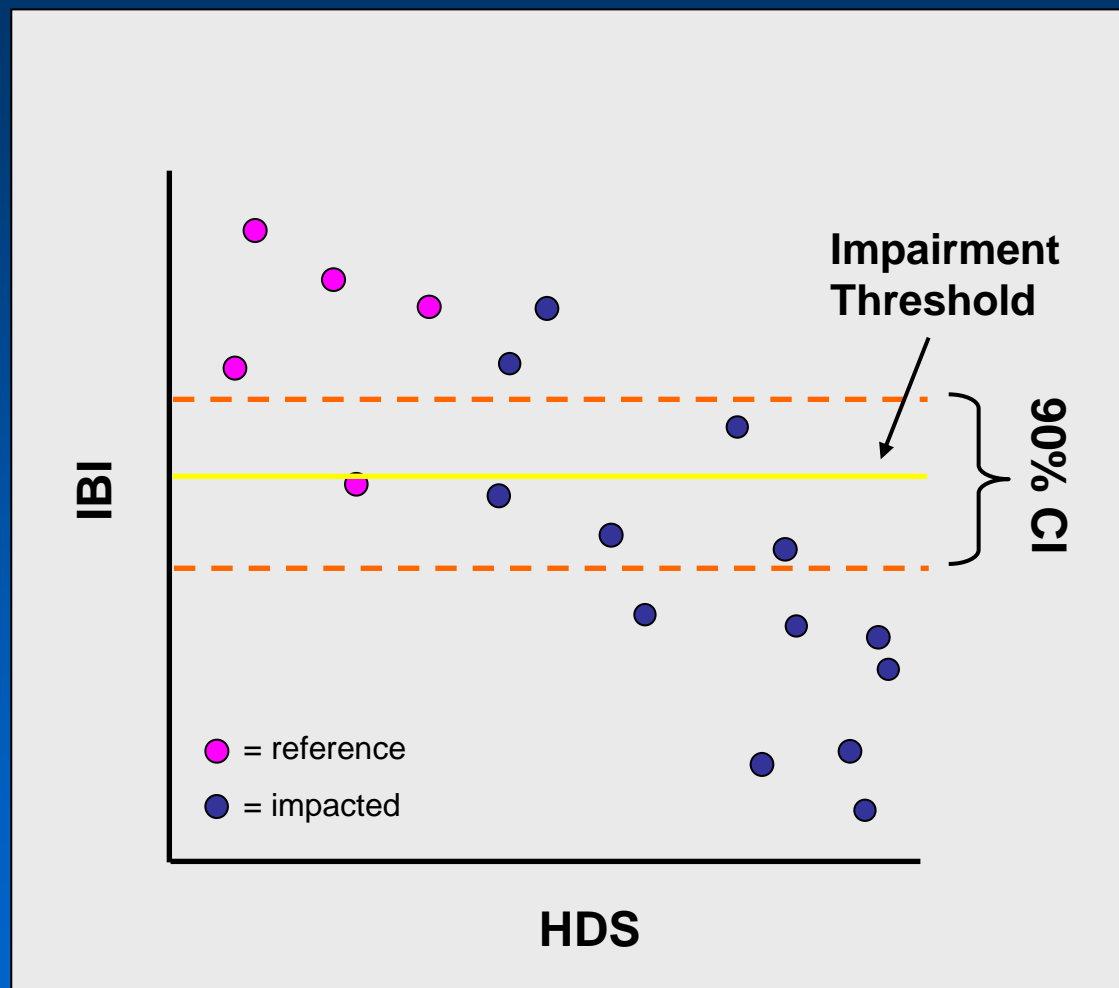
- Multimetric Index
- Based on deviation from reference conditions (least impacted sites)
- Measurement of condition (quality)



Introduction

Assessment

- Aquatic Life Use Support (ALUS)
- Impairment threshold
 - Lowest scoring reference site
- Confidence interval



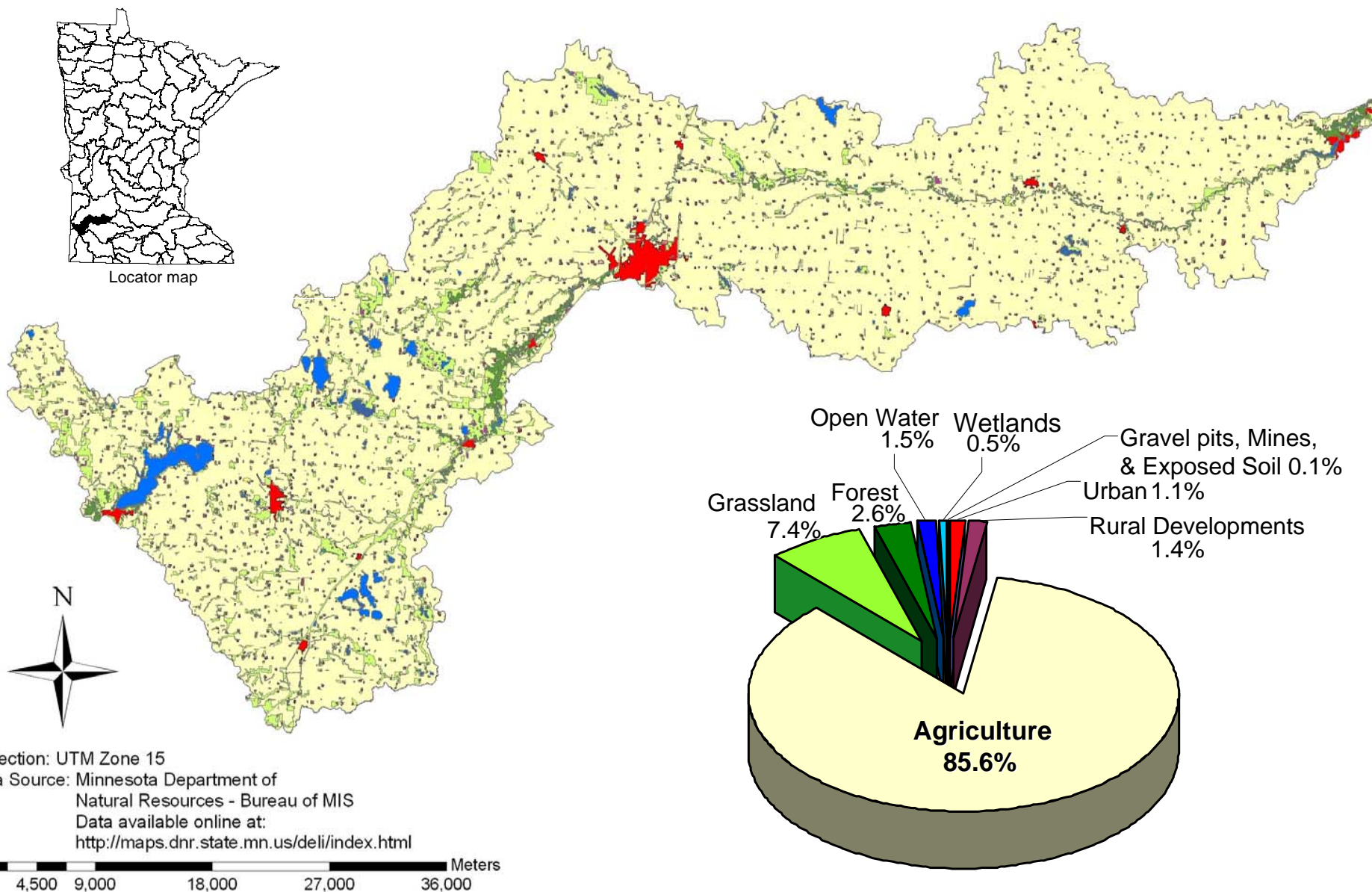
Study Objectives

- Assess quality of depressional wetlands in a watershed using a probabilistic survey
- Estimate wetland loss since early 1980s
- Evaluate feasibility of utilizing a randomized survey design for wetland condition monitoring



Study Area-Redwood River

1990 Land Use in Redwood Watershed



Target Population

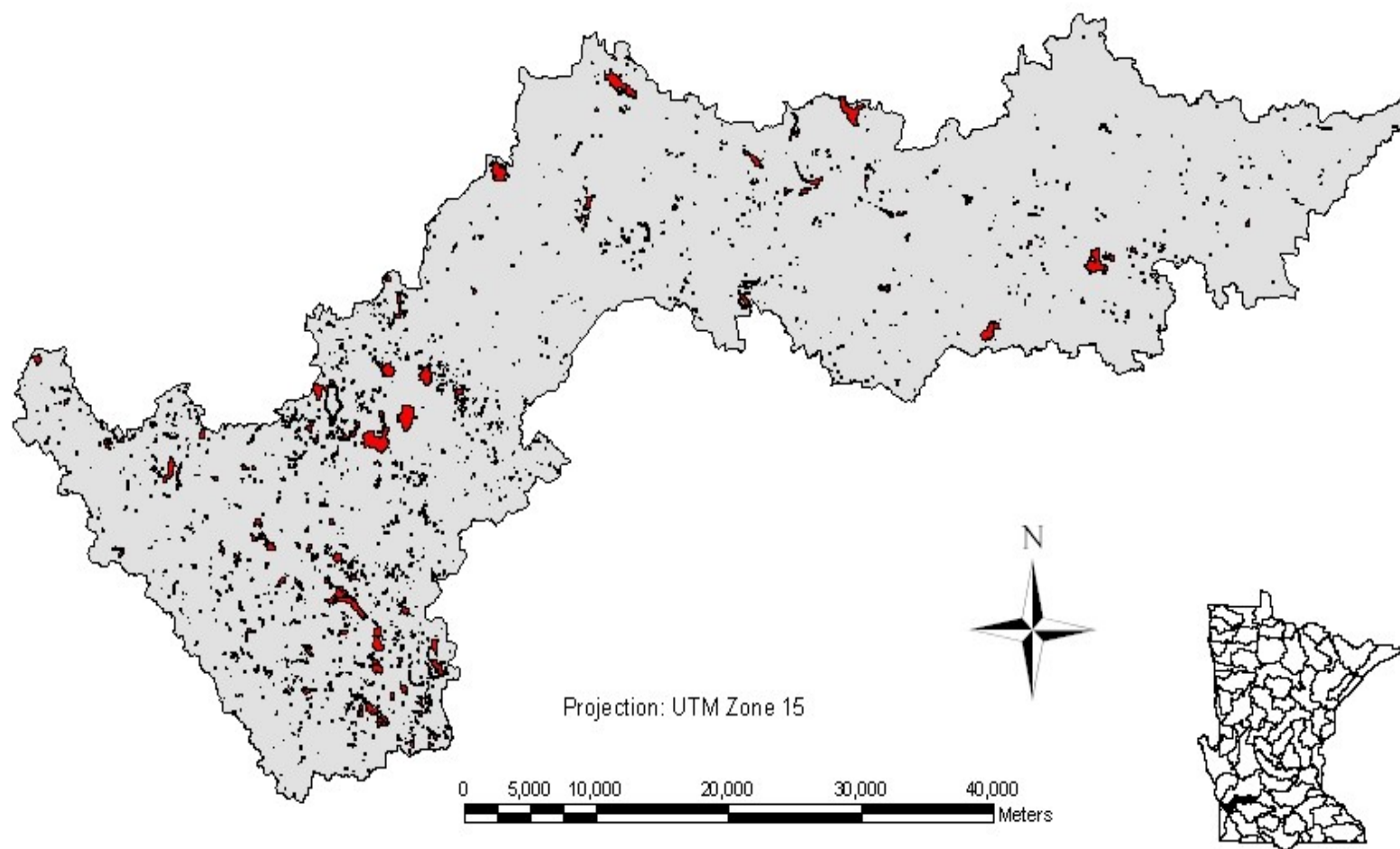
Seasonal, Semi-permanent,
& Permanent Emergent
Depressional Wetlands



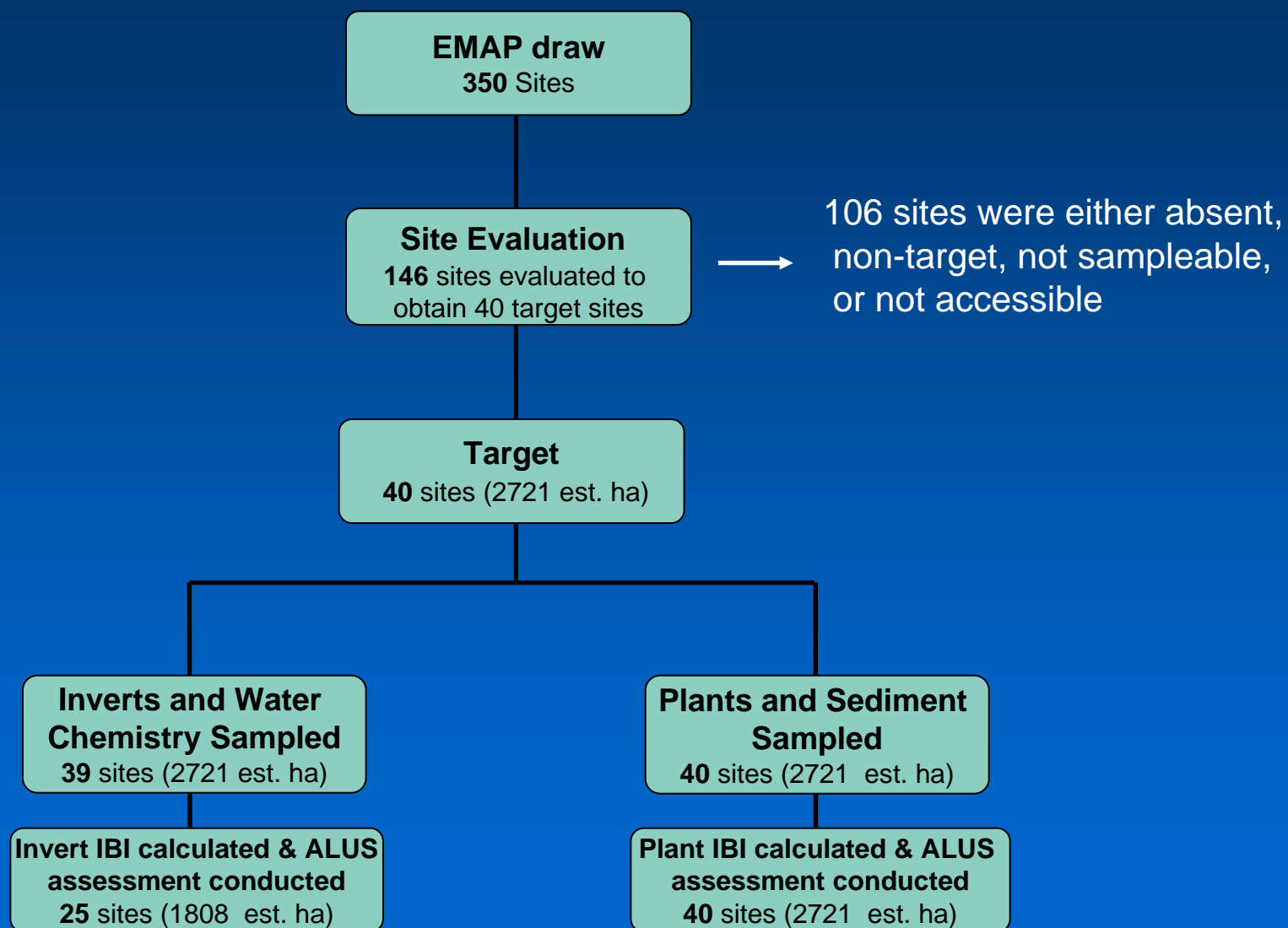
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Sample Frame-NWI

Redwood River Watershed Sample Frame: Depressional Wetlands

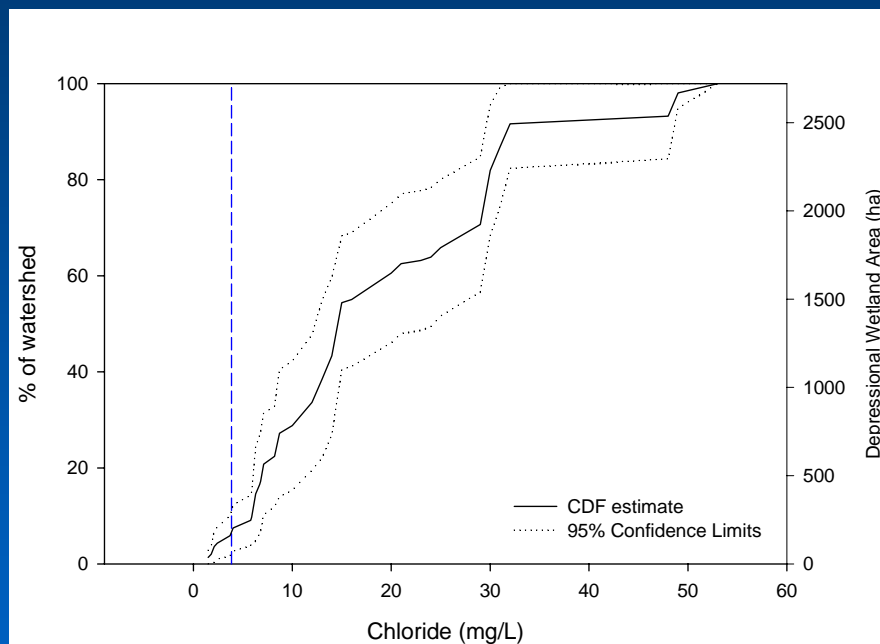


Site Selection & Sampling

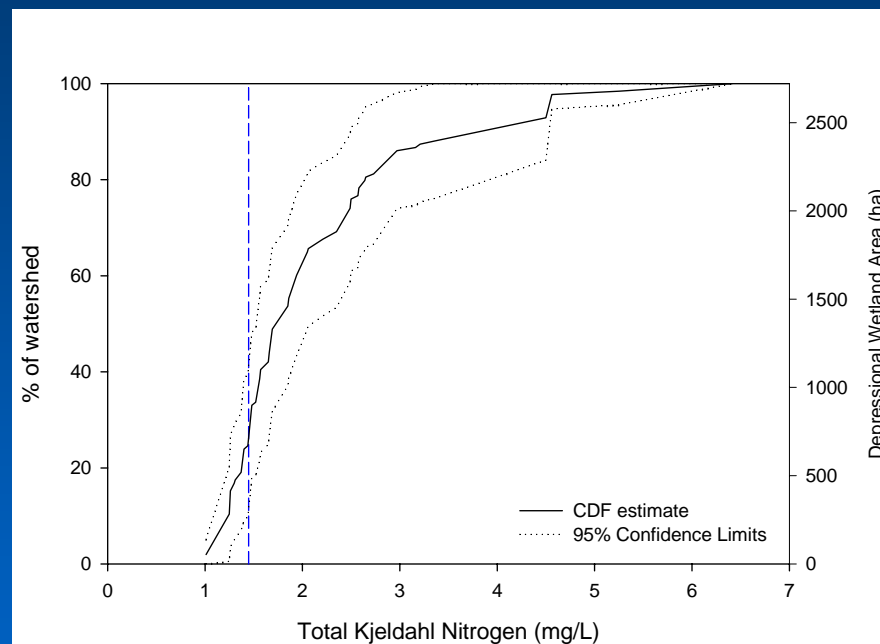


Results-Water Chemistry

Chloride



Total N



— — — —

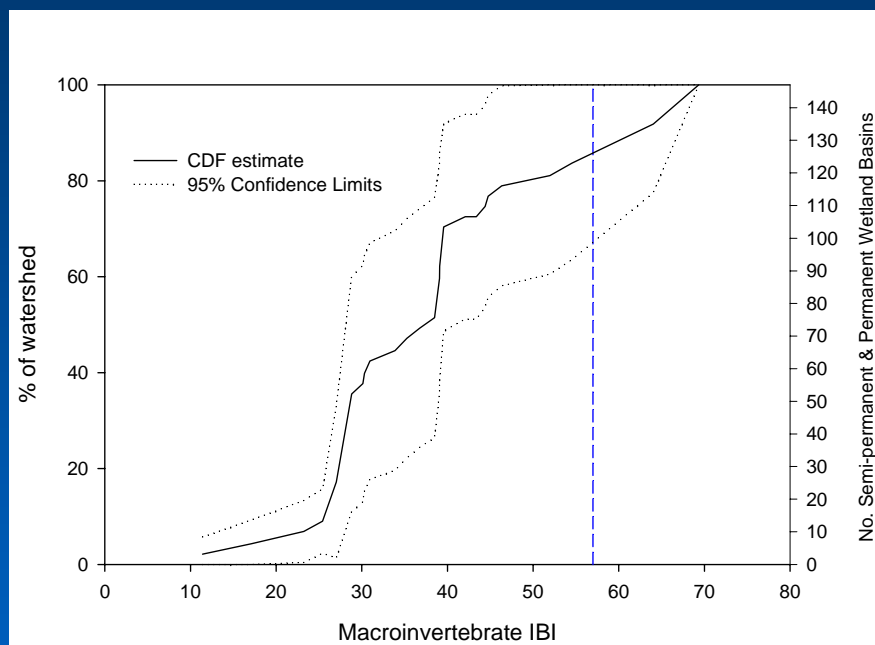
Regional Reference Conditions



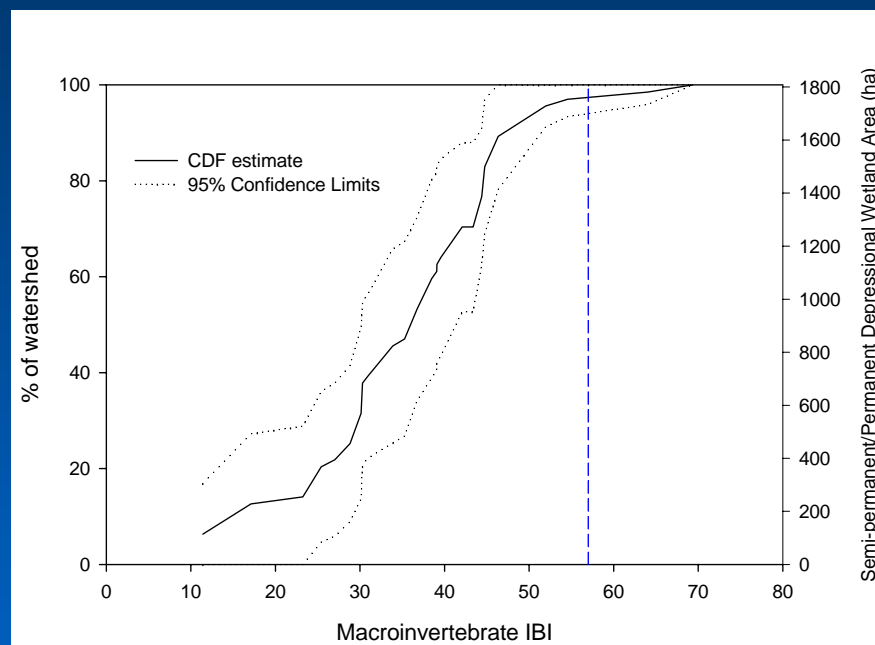
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Results-Invertebrate IBI

Number of Basins



Cumulative Area



--- Biological Impairment Threshold

Impairment

Basins – 86%

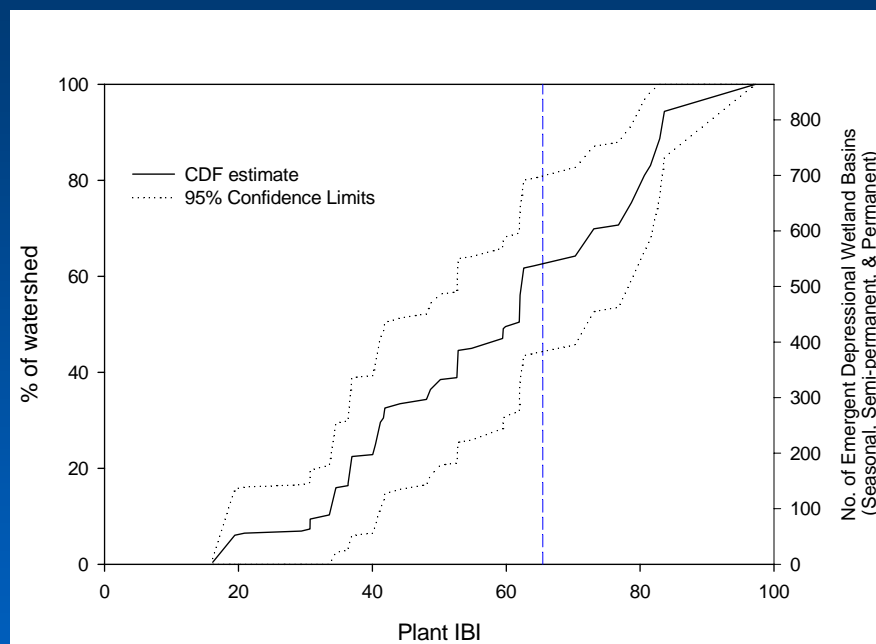
Area – 97%



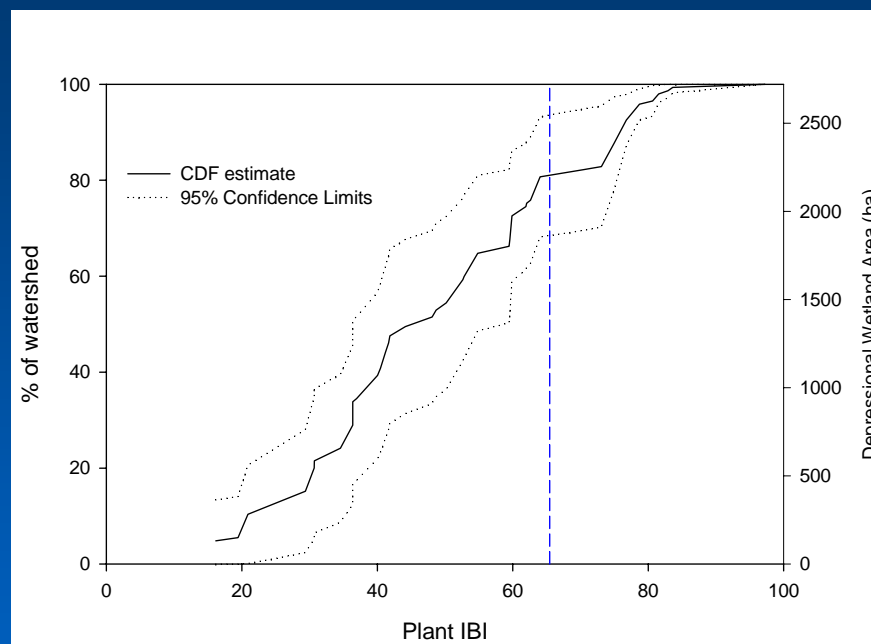
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Results-Plant IBI

Number of Basins



Cumulative Area



Biological Impairment Threshold

Impairment

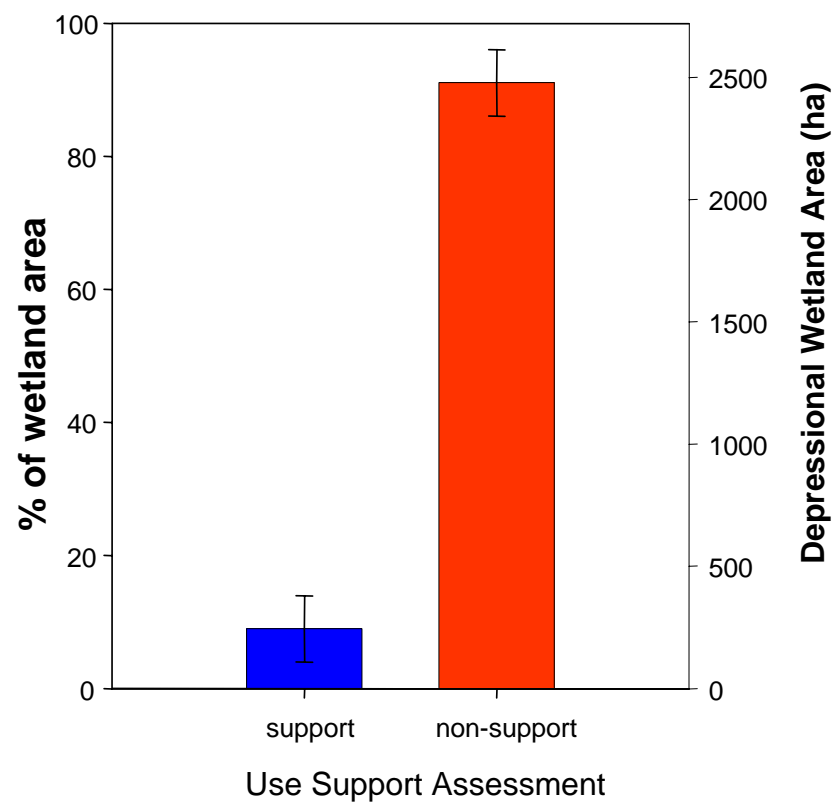
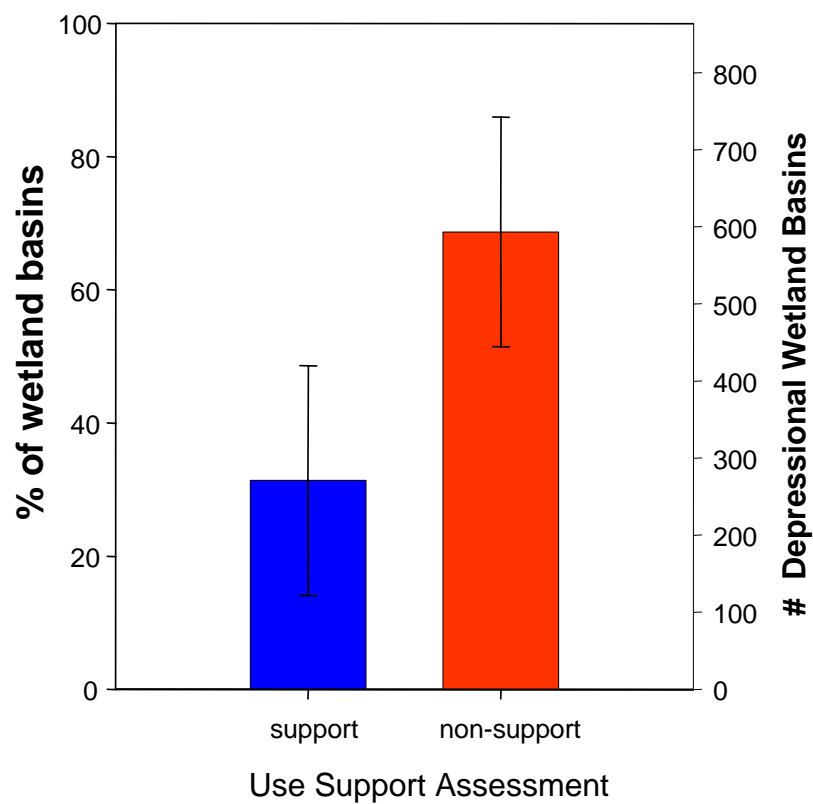
Basins – 63%

Area – 81%



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Results-ALUS



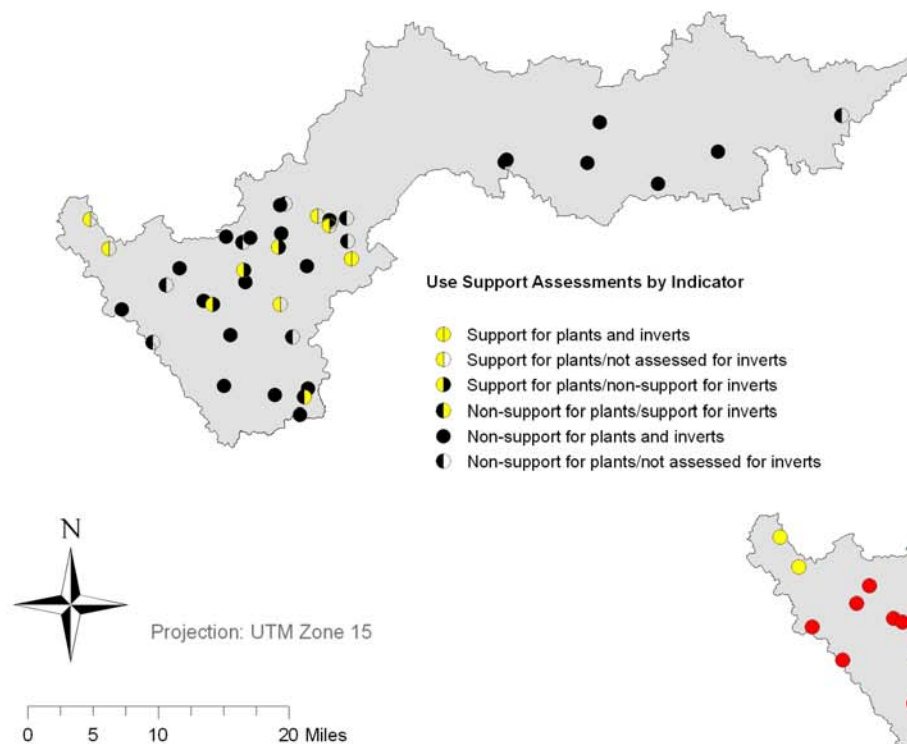
Error bars = 95% Confidence limits



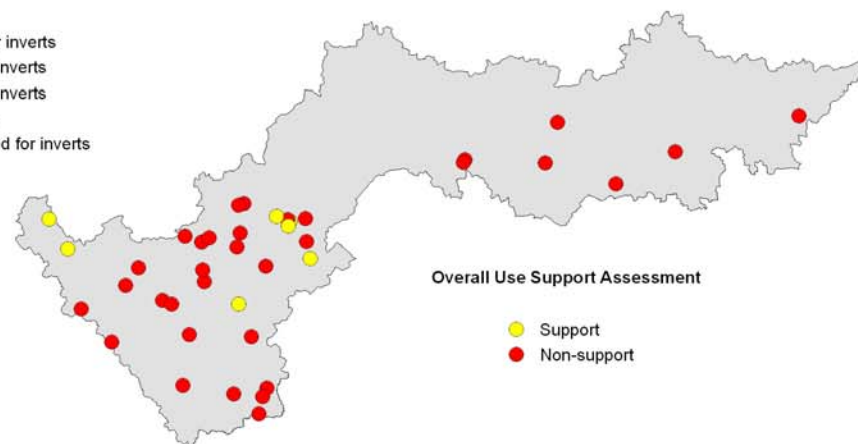
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Results-ALUS

A. Use Support Assessment by Biological Indicator

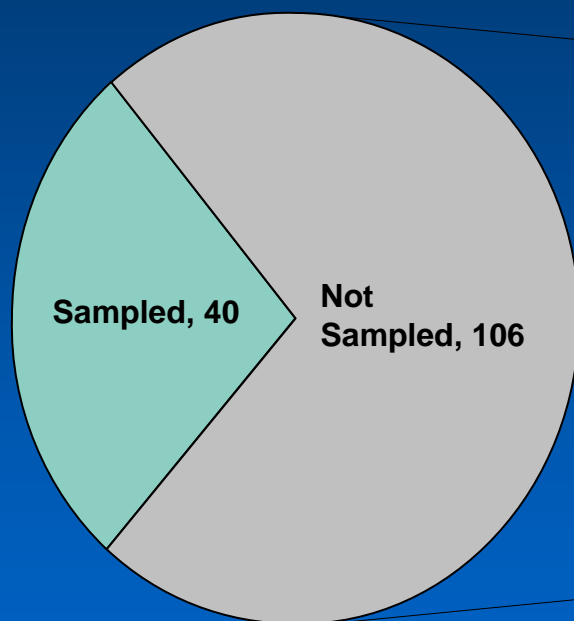


B. Overall Use Support Assessment

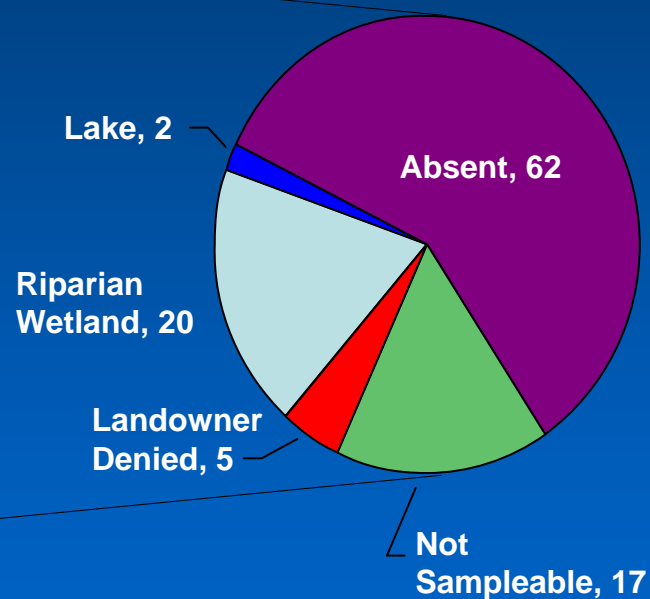


Results-Site Evaluation

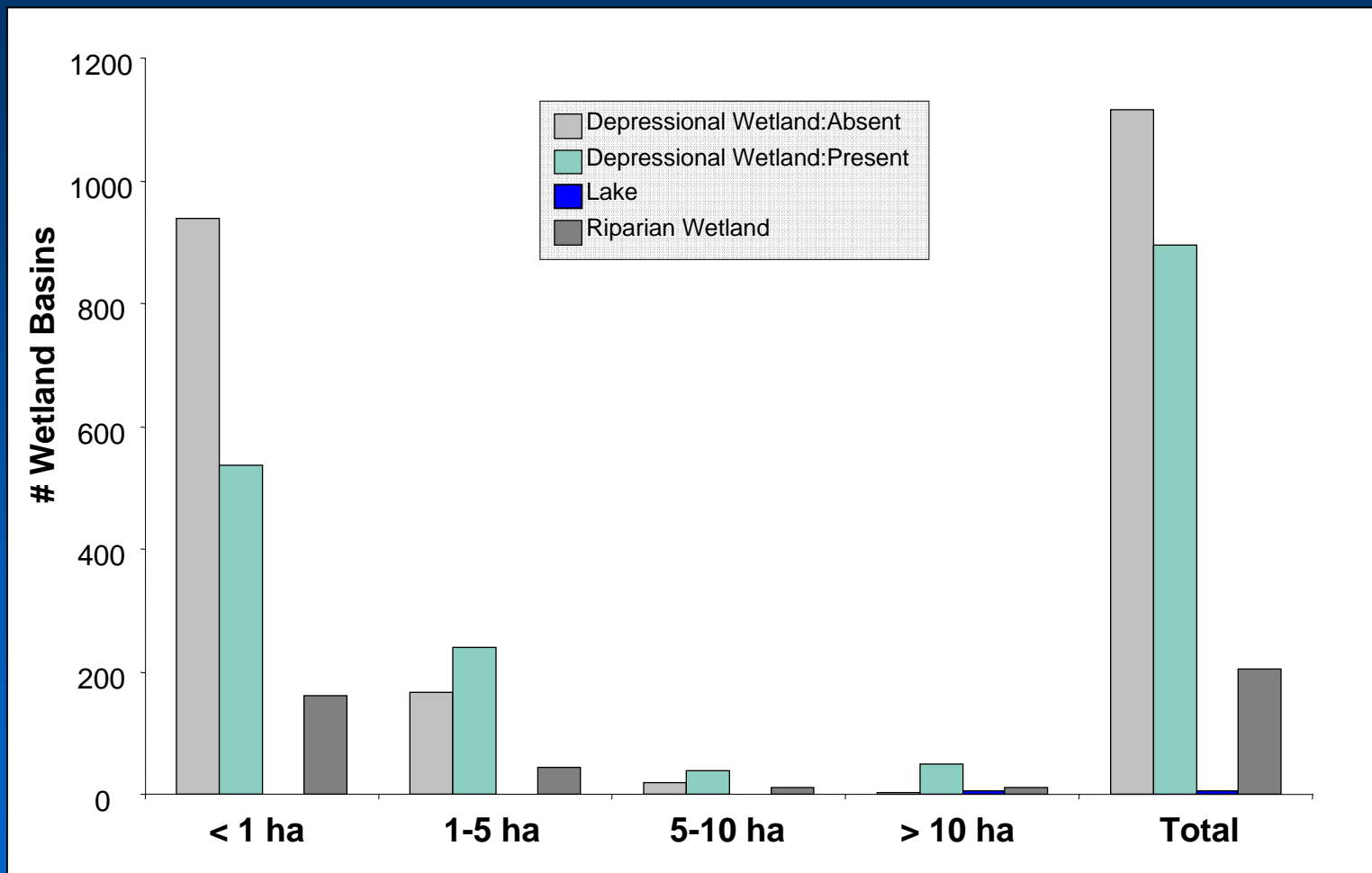
All Evaluated Sites



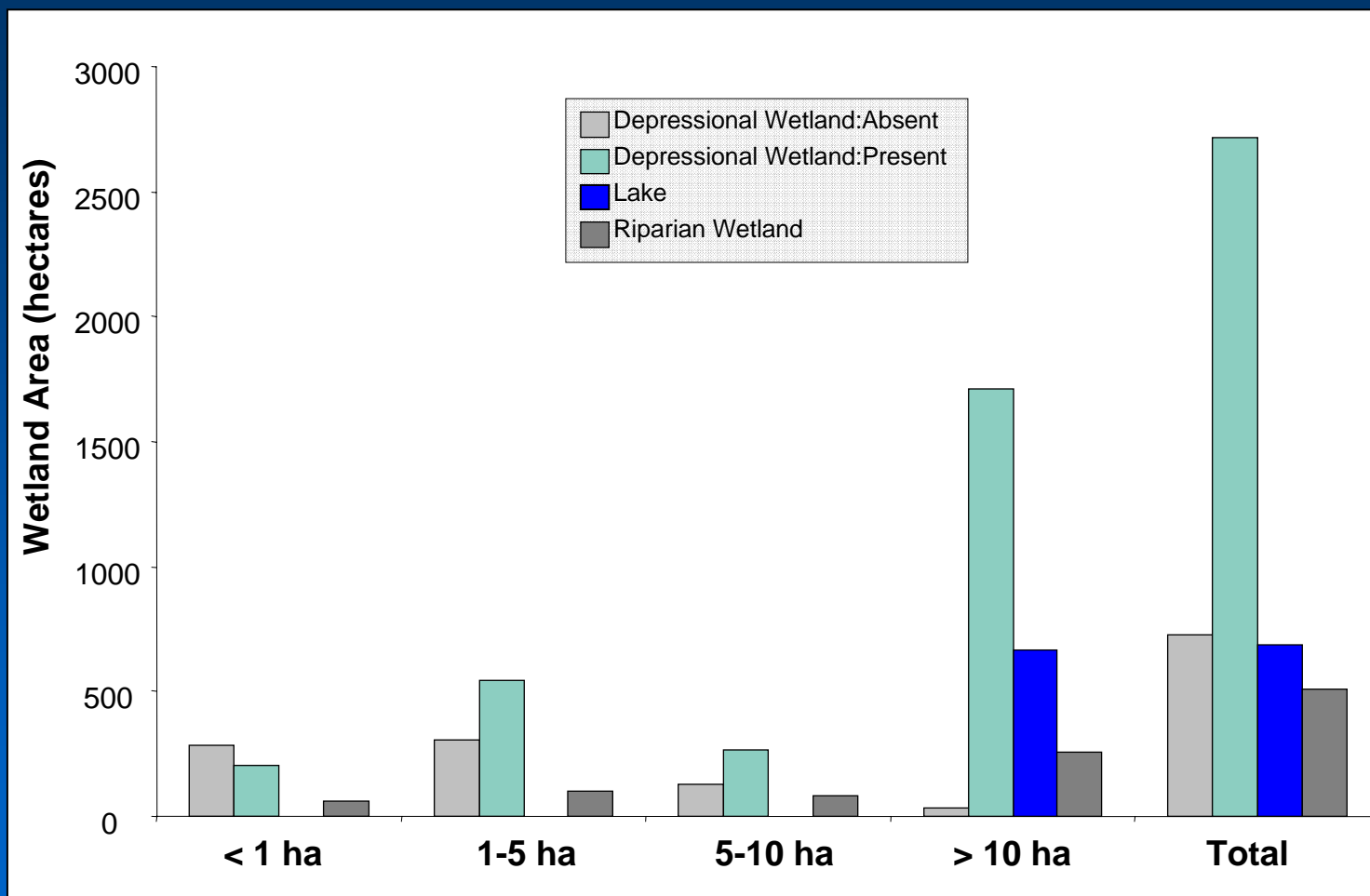
Dropped Sites



Results-Basin Extrapolation



Results-Area Extrapolation



Results-Wetland Losses

Size Category (ha)	Estimated No. of Wetland Basins			Estimated Wetland Area (ha)		
	circa 1980	2003	% change	circa 1980	2003	% change
< 1	1475	536	-63.6	486.8	201.7	-58.6
1-5	407	241	-40.9	848.2	541.2	-36.2
5-10	58	39	-33.3	396.2	266.8	-32.7
> 10	51	48	-6.2	1741.7	1711.1	-1.8
Total	2012	896	-55.5	3437.6	2714.4	-21.0



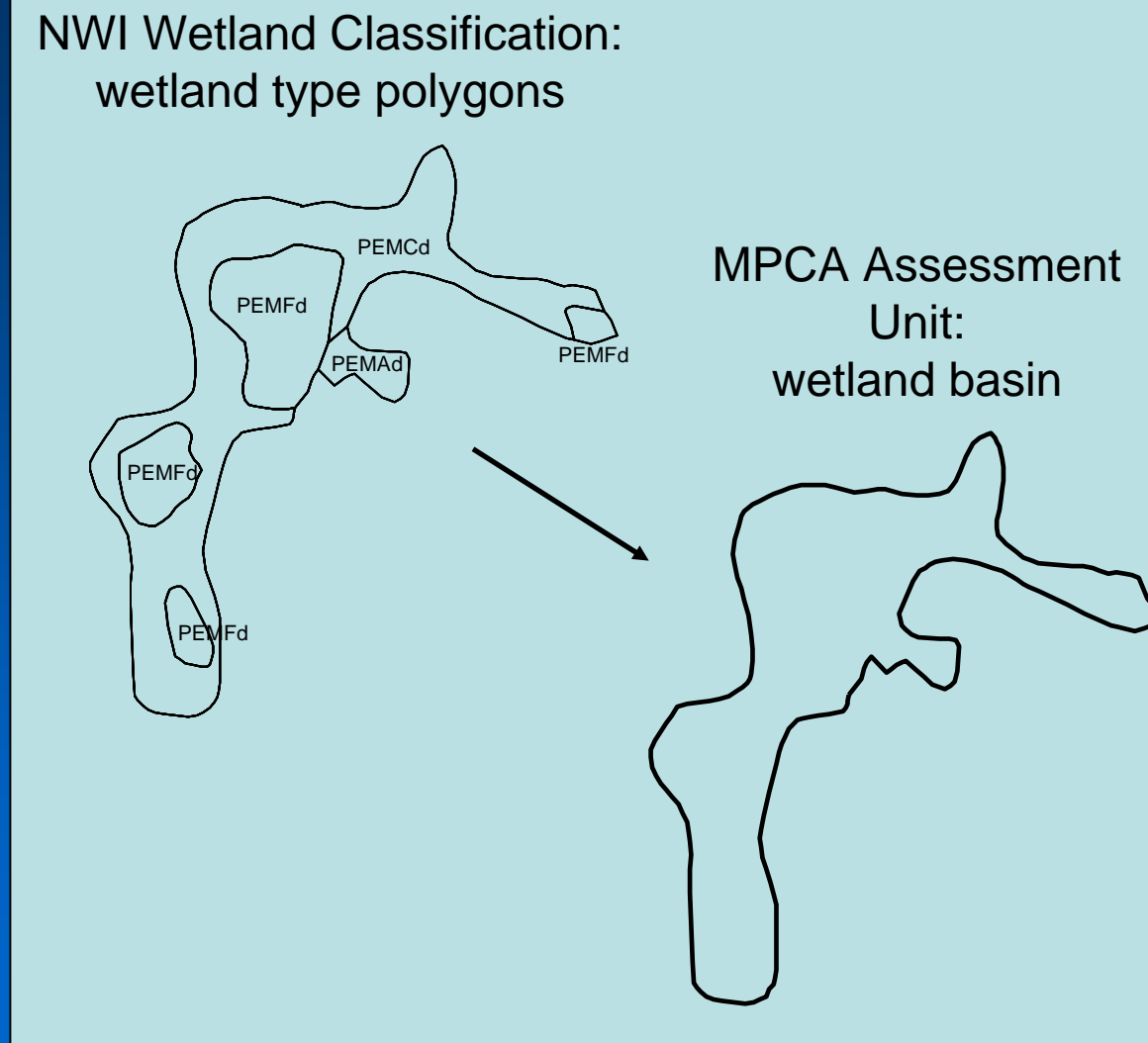
Conclusions

- Majority of depressional wetlands in the Redwood are biologically impaired
- Likely stressors: nutrients, invasive species, sedimentation, altered hydrology
- Significant losses of small (seasonal) wetland basins from 1980-2003
- These are *not* net losses
 - No accounting for permitted actions & mitigation, and/or wetland additions from conservation programs (CREP, WRP, etc)



Conclusions-Probabilistic Survey

- Accurate sample frame is crucial
 - NWI format is problematic
 - Data is > 20 yrs
- Access not a big issue



Acknowledgements

Mark Gernes – idea for project, study design, field work, comments & suggestions on report

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Sue Elston

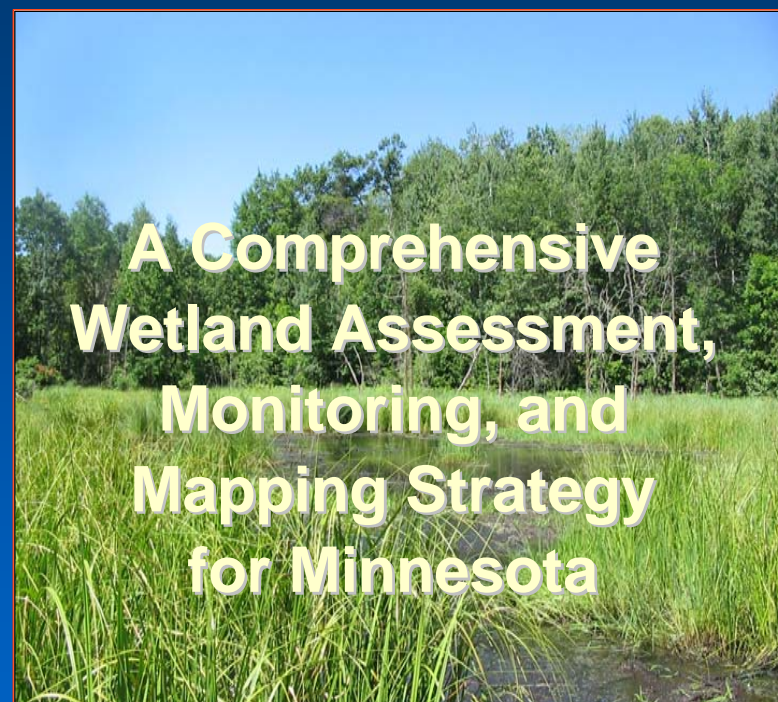
Alicia Hernandez



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Comprehensive Wetland Assessment, Monitoring, and Mapping Strategy (CWAMMS)

- Probabilistic Survey of Wetland Quantity and Quality (Statewide Status & Trends)
- Update NWI
- Develop Web-Based Wetland Accounting System (permit and mitigation tracking)



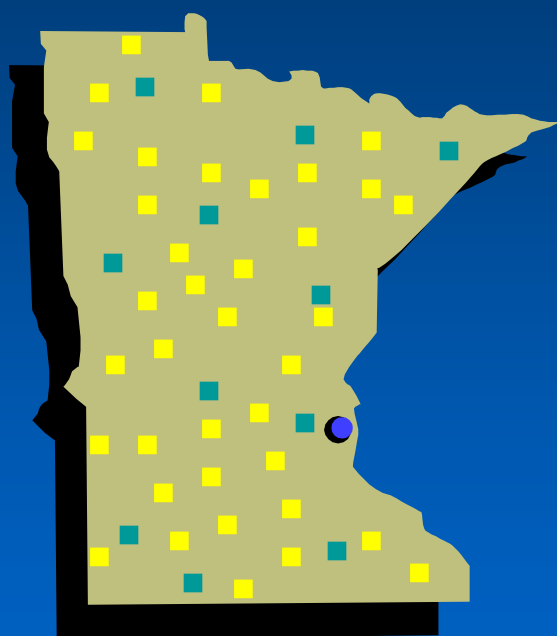
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July 2006

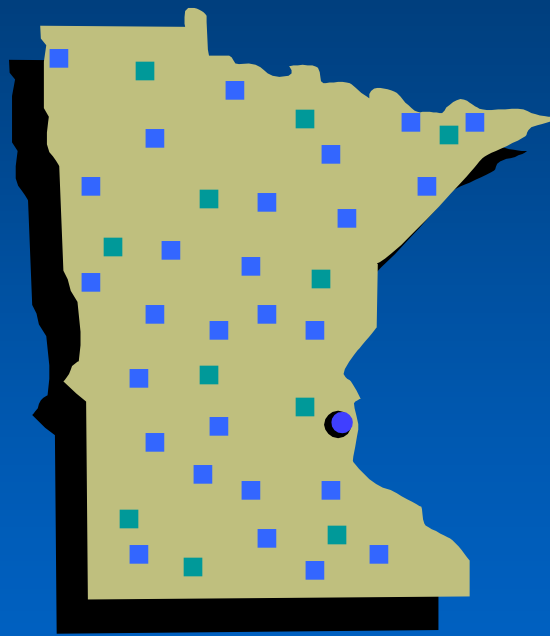
Probabilistic Statewide Wetland Survey

3-Panel Interpenetrating Design



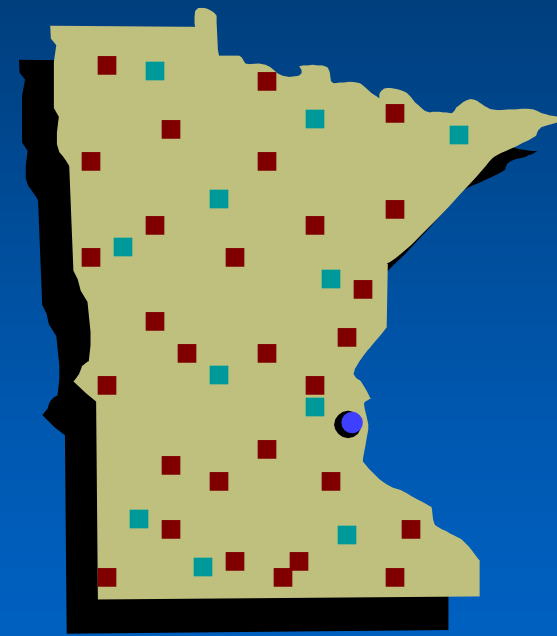
Year (Panel) 1

1580 1 mi² plots



Year (Panel) 2

1580 1 mi² plots



Year (Panel) 3

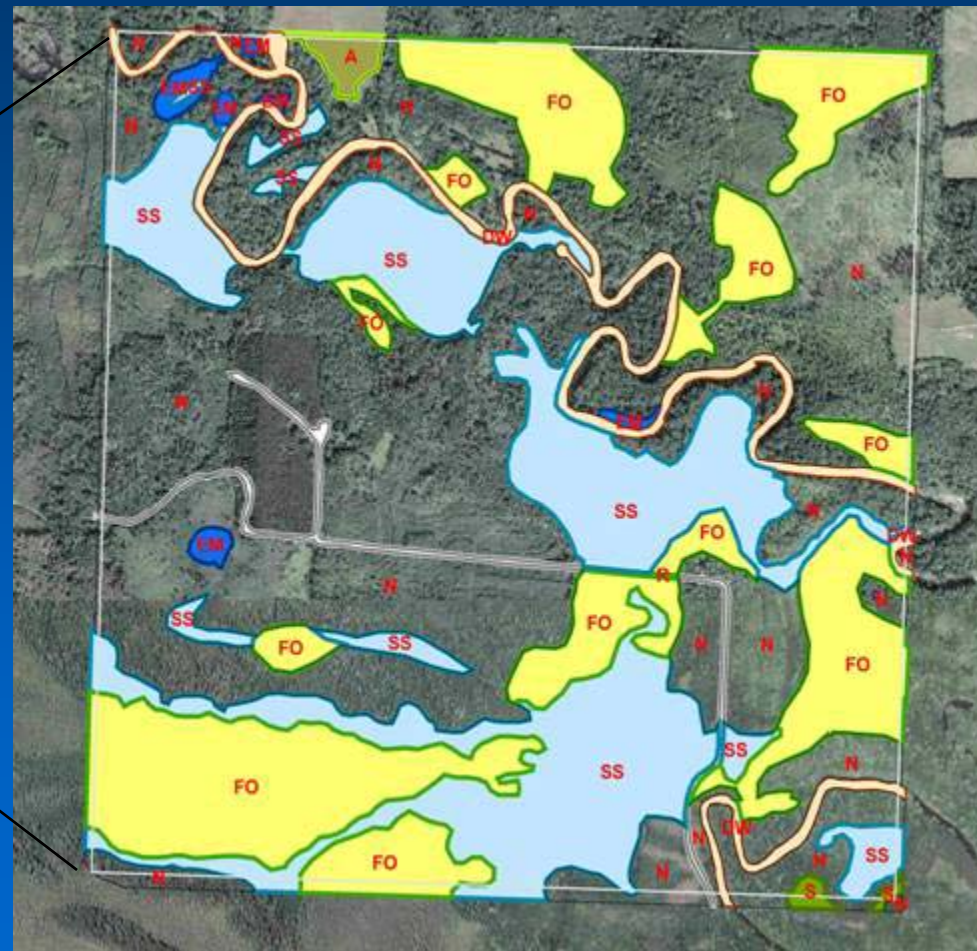
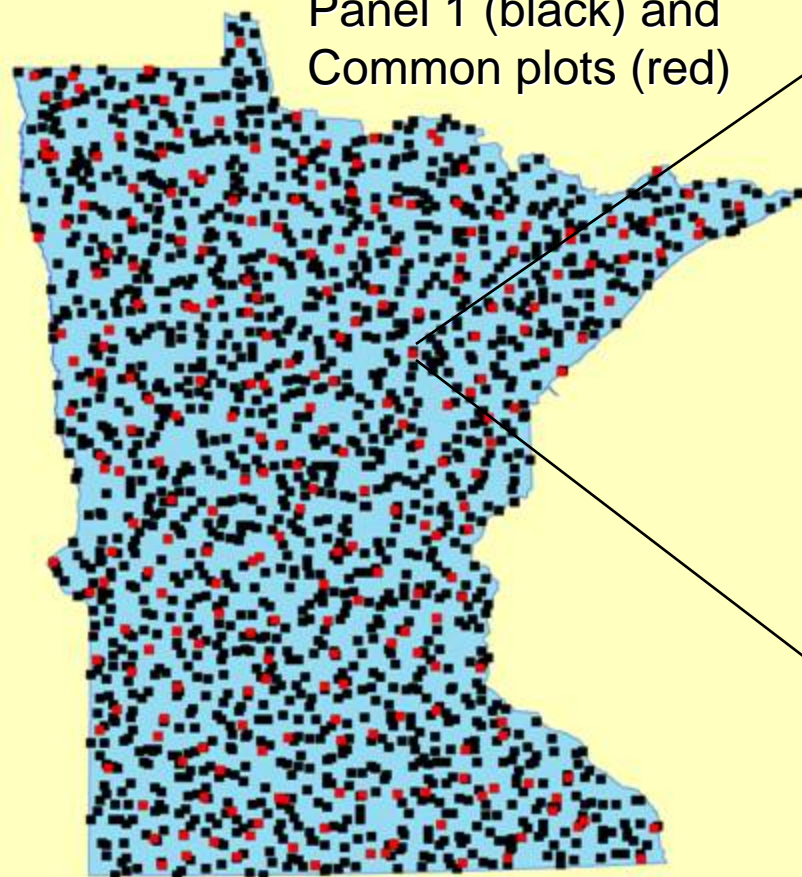
1580 1 mi² plots

+ 250 Common Plots Sampled each year ----->

Panel 1: 2006 Wetland Quantity Status 2007 Wetland Quality Status

2006

Panel 1 (black) and
Common plots (red)



Questions?



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Redwood Report available at:

<http://www.pca.state.mn.us/water/biomonitoring/bio-wetlands.html>

More CWAMMS information available at:

<http://www.pca.state.mn.us/water/wetlands/cwamms.html>